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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF		:
CARINNE FLEURY, ET AL.		GROUP: 1794
SERIAL NO: 10/567,901		:
FILED:	DECEMBER 7, 2006	EXAMINER: NELSON
FOR:	TRANSPARENT SUBSTRATE COMPRISING AN ANTIREFLECTION COATING	:

DECLARATION UNDER 37 C.F.R. 1.132

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

I, Vincent REYMOND state that:

1. I am a graduate of Ecole de Chimie Polymères et Matériaux (Strasbourg, France) and received my PhD in Physics and Chemistry of Material from the University of Bordeaux in 2004.

2. I have been employed by Saint-Gobain Recherche for 5 years as a Research Engineer in the field of thin film deposition. I am now managing a R&D team working on new lowE coatings for building applications.

3. I am familiar with the specification and claims of this application.

4. I understand that the claims have been rejected by the U.S. Patent Office as obvious in view of Wolfe, US 5,563,734.

5. Wolfe in col. 4, lines 32-36 describes that the refractive index must be limited in a range between 1.98 and 2.08 for the second dielectric layer, i.e., the layer placed above the

silver layer, where a composite film of SiZrN type is placed. These values are acknowledged in the rejection of the Official Action.

6. One aspect of the claims and the technology described in the application is the selection of the atomic percentage of zirconium within the high index layer of the antireflection coating to be such that the ratio of Si/Zr is between 4.6 and 5, corresponding to a refractive index from about 2.20 to about 2.25.

7. The documents cited by the U.S. patent office do not describe any information concerning the ratio between the silicon and the zirconium.

8. In order to show the improvement linked to this particular ratio and more particularly to the Wolfe's disclosure, I calculated and simulated the optical and heat insulation properties of four different stacks: one without zirconium, one according to the instant invention, one according to Wolfe and one with a very high content of zirconium.

In all samples, the stack on the glass is of the type:

Glass/	Si_3N_4:Zr/ (M_1)	ZnO/	Ag1/	Ti/	ZnO/	Si_3N_4:Zr/ (M_2)	ZnO/	Ag2/	Ti/	ZnO/	Si_3N_4:Zr/ (M_3)	$ZnSnO_x$
Thickness (nm)	See Table1	5	See Table1	0,2	5	See Table1	5	See Table1	0,2	5	See Table1	2

9. More particularly, the simulations were made using the Code ® modeling software developed by Mr. W. Theiss. This software is directed to thin film optical design (see www.wtheiss.com). This software is based on reliable optical models and, to the best of my knowledge, is that one usually used to calculate the optical and heat transfers though any glazing, especially when provided with layer stack(s) on at least one of its faces. The stack of layers is applied as usual on face 2 of a conventional double glazing. The chosen illuminant was the D65 one at an angle of 2°. To take into account the absorption of the zirconium when present at higher amounts in the layer, the k value (imaginary part of the refractive index n) was set at a value of 0.01.The n and k values are given at the 550 nm wavelength.

10. For each stacking, the thicknesses of the successive silver functional layers and silicon nitride antireflective layers were adjusted so as to reach a value of the light transmittance (T_L) across the double glazing at least equal to 70%, without impairing its color (i.e. negative b* values in the L*, a*,b* colorimetry system, as disclosed in the specification).

11. The results, as obtained using the Code ® modeling software, are gathered in the following Table 1 :

	Reference : no Zr	Wolfe's : Si / Zr = 10	Instant invention : Si / Zr = 4.6	High Zr ratio : Si / Zr = 3.2
	n=2.00	n=2.08	n=2.25	n=2.40
	Thickness (nm)	Thickness	Thickness	Thickness
Si_3N_4 : Zr (M3)	22	21.5	20	18.5
Ag 2	10.5	11.2	12.2	12.2
Si_3N_4 : Zr (M2)	67	64	56	49
Ag1	8.5	8.9	9.8	8.6
Si_3N_4 : Zr (M1)	31.5	28	23.5	21.5
T_L	71.5	71.3	70.6	70.3
Te	38.5	38.0	36.9	38.4
$R_L$ext	12.9	12.9	13.0	11.0
a*(Rext)	-1.9	-2.4	-0.2	-4.1
b*(Rext)	-3.2	-2.6	-1.4	-0.7
R_E	36.6	37.2	38.5	34.7
SF	41.9	41.4	40.2	42.0
Selectivity (T_L/SF)	1.71	1.72	1.76	1.68

Table 1

12. The results as reported in Table 1 show clearly the unexpected advantages with connection to the use of Si_3N_4 doped layers with Zirconium, provided that the Si/Zr ratio remains in the range according to the instant invention.

More particularly :

- it is possible to keep high level of light transmission, i.e. equal to or superior to 70% while increasing the thickness of the silver functional layers,
- the solar factor SF of the double glazing is decreased and the heat reflectance is increased, which means that the percentage of the total solar radiant factor passing through the double glazing (i.e. entering the room) is decreased,

- the selectivity of the double glazing comprising the stacking according to the instant invention is higher than those with another Si/Zr ratios (higher or lower), which means that it enables to provide sufficient light transmission while having an energy transmission as low as possible. This allows to prevent any overheating of the room in sunny weather.

13. The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Signature

July 8th 2010
Date

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